

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : FUJITSU LTD

(22)Date of filing : 28.11.1991

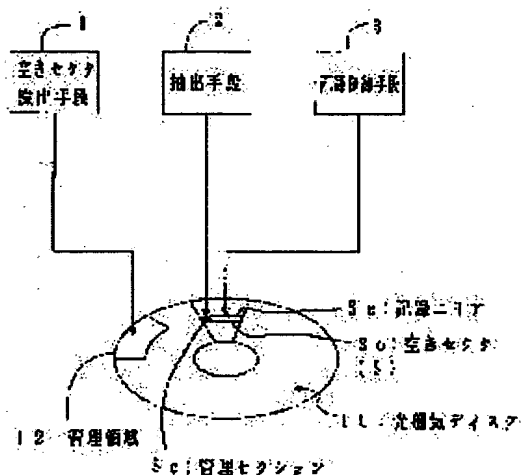
(72)Inventor : **NANBA YOSHIYUKI**  
**MIHARA MOTONOBU**

## (54) RECORDING METHOD AND DEVICE OF MAGNETO-OPTICAL DISK

**(57)Abstract:**

**PURPOSE:** To reduce as much as possible the generation frequency of reproduction errors caused by over utilization and to obtain uniform quality reproduction signals in a magneto-optical disk recording method and the device.

**CONSTITUTION:** In a magneto-optical disk recording method which detects an empty sector S0 of a magneto-optical disk 10 prior to a recording and information is recorded in the sector S0, the number of utilization of each sector S is recorded in a prescribed management section Se, the number of empty S0, which is detected by an empty sector detection means 1 prior to a recording, are made plural and the empty sector S0, which has a least amount of utilization number, is extracted as a recording region by an extracting means 2.



## LEGAL STATUS

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**[Date of registration]**

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] In the record method of the magneto-optic disk which detects the empty sector (S0) of a magneto-optic disk (10) before record, and records information on this empty sector (S0) The record method of the magneto-optic disk characterized by recording the usage count of each sector on the predetermined management section (Se), making into plurality the number of the empty sectors (S0) detected before record, and making the empty sector with few usage counts in it (S0) applicable to record.

[Claim 2] In the recording device of the magneto-optic disk which detects the empty sector (S0) of a magneto-optic disk (10) before record, and records information on this empty sector (S0) an empty sector appearance means (1) to detect two or more empty sectors (S0) before record the above-mentioned empty sector appearance means (1) An extraction means (2) to extract the sector (S0) with few usage counts in two or more detected empty sectors (S0) extraction was each above-mentioned carried out, while it is vacant and recording information on a sector (S0) Record control means which record the usage count of this empty sector (S0) on a predetermined field (3) Recording device of the magneto-optic disk characterized by having.

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[Translation done.]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] Especially this invention relates to the record method of a magneto-optic disk, and equipment about an optical disk.

[0002]

[Description of the Prior Art] In recent years, highly efficient-ization progresses, progress of processing speed and a throughput is remarkable, as for a computer system, the improvement in a performance of external storage is needed in connection with this, and the optical-magnetic disc equipment which is high-density storage is in the limelight. A magneto-optic disk irradiates a laser beam with a diameter of about about 1 micrometer at a disk, and since the sense of the MAG of perpendicular magnetic anisotropy films used as record film is made to correspond to '1' of information, and '0', it can make recording density very high in comparison with the magnetic disk etc.

[0003] Drawing 3 shows the outline of a magneto-optic disk, a record regenerative apparatus (optical-magnetic disc equipment), and a control unit. The sector (they are 25 sectors at 1 round) S which classified the plate surface into the radial is formed in the magneto-optic disk 10, and it is made to manage further whether information is recorded on each of this sector S in the management field 12 established in area different from the above-mentioned sector S on the plate surface of a magneto-optic disk.

[0004] Optical-magnetic disc equipment 20 is equipped with the optical head and the magnetic head for performing informational record reproduction on the plate surface of the spindle motor which rotates the above-mentioned magneto-optic disk 10, and a magneto-optic disk 10, and is controlled by the control unit 30. A control unit 30 is equipped with CPU31, ROM32 which contained the program, and RAM33 which contained information, and also it is equipped with the required appurtenance.

[0005] And when recording, an optical head is first located on the above-mentioned management field 12, and it is vacant with a control unit 30, and is a sector S0. It is found and is the empty sector S0. It is this empty sector S0 about the optical head from the address, and the magnetic head. Alignment is turned up and it is this empty sector S0. Elimination is applied. This elimination irradiates a laser beam by power which record film becomes more than Curie temperature, and is performed by impressing a magnetic field in the elimination direction. Subsequently, record is made by impressing the magnetic field of power weaker than the time of elimination, or it to an opposite direction according to recording information with the elimination direction.

[0006] The informational magnetization state (facing up and facing down) corresponding to '1' and '0' is formed on a magneto-optic disk 10 of this, and it becomes possible to record. In reproducing, the laser beam which is the grade to which the temperature of record film does not rise is irradiated, and it reproduces using the principle of the Kerr effect which the plane of polarization contained in the reflected light by the sense of magnetization rotates.

[0007]

[Problem(s) to be Solved by the Invention] However, with the above composition, since information will be repeatedly recorded on the same sector on a magneto-optic disk, if the number of times of the repeat increases, the record film of a magneto-optic disk and its protective coat deteriorate, a recording characteristic will become bad, the signal which reproduces this sector and is acquired will deteriorate, and it will become the cause of a reproduction error.

[0008] When one management sector is prepared in JP,63-249974,A for two or more sectors of every as one method of solving the above-mentioned technical problem, the usage count of two or more of these sector groups is recorded on this management sector and this usage count becomes beyond a predetermined value, the optical disk unit which forbids record into this sector S is indicated.

[0009] However, while according to this method it cannot correct even if dispersion in operating frequency is in each sector between groups, but dispersion will be produced in the quality of a regenerative signal, there is a fault to which duration of service follows on becoming long, the sector group by which a disable is carried out increases, and a write-in capacity becomes small.

[0010] While this invention is proposed in view of the above-mentioned conventional situation and reducing the generating frequency of the reproduction error by the excess of use as much as possible, it aims at offering the reproduction method of the magneto-optic disk which can obtain a homogeneous regenerative signal, and equipment.

[0011]

[Means for Solving the Problem] This invention has adopted the following meanses, in order to attain the above-

mentioned purpose. That is, as shown in drawing 1, it is the empty sector S0 of a magneto-optic disk 10 before record. It detects and is this empty sector S0. The number of the empty sectors S0 detected before record in the record method of the magneto-optic disk which records information while recording the usage count of each sector S on the predetermined management section Se is made into plurality, and it is the empty sector S0 with few usage counts in it. It considers as a record section.

[0012] Two or more above-mentioned empty sectors S0 Two or more empty sectors S0 which were detected with the empty sector appearance means 1, and were detected as mentioned above with the extraction means 2 Inner sector S0 with few usage counts It extracts and they are the record control means 3 further. Extracted empty sector S0 While recording information, it is this empty sector S0. A usage count is recorded on a predetermined field.

[0013]

[Function] Empty sector S0 Empty sector S0 with few usage counts in multiple-selection *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne. By recording, the usage count of each sector becomes always uniform. Even if the time of a magneto-optic disk becomes long, while being able to homogenize the regenerative signal obtained by this, it is prevented that the quality of the regenerative signal of a specific sector deteriorates.

[0014]

[Example] Drawing 1 is the functional block diagram of the equipment of this invention, and drawing 2 is the flow view showing the procedure of this invention.

[0015] First, when there are record directions ( drawing 2 step S1), an optical head searches the management field 12 of a magneto-optic disk 10, is vacant and transmits the information to the sector appearance means 1 (when there are data which should be recorded). The empty sector appearance means 1 detects two or more empty sectors S0 (for example, two empty sectors) from the above-mentioned information ( drawing 2 step S2).

[0016] Thus, two or more detected empty sectors S0 About each, a usage count is investigated further. That is, it is made to write in the specific management section Se of the head section of each sector S, and this usage count is the above-mentioned empty sector S0. When chosen, it is the empty sector S0. According to the address, the usage-count information which was moved and was recorded [ head / optical ] on the above-mentioned management section Se in the magneto-optic-disk 10 top is reproduced. This information is read with the extraction means 2, and they are the two above-mentioned empty sectors S0. Empty sector S0 of the method of a low of an inner usage count It extracts ( drawing 2 step S3). And empty sector S0 extracted in this way using the record control means 3 While writing a new usage count (usage count which added 1) in the management section Se, it is this sector S0. Information is written in the record area Sd (drawing 2 step S4).

[0017] It writes in by this and, sometimes, is the empty sector S0 of the direction with few [ always ] usage counts. It can be chosen, even if a usage count increases, the recording rate of each sector S can homogenize as a whole, and a homogeneous regenerative signal can be obtained.

[0018] In addition, you may make it add the above-mentioned empty sector appearance means 1, the extraction means 2, and the record control means 3 to the above-mentioned control unit 30 as a function like software, or they may be added as another software or a circuit. moreover, the above — setting — empty sector S0 \*\*\*\*\* — although the number extracted was set to two, if the processing time disregards a bird clapper for a long time somewhat — the above-mentioned empty sector S0 \*\*\*\*\* — homogenization of a usage count can be acquired, so that there are many numbers extracted Moreover, it is each sector S0 about the management section Se which manages a usage count. Although prepared in the head section, it is each sector S0 like the above-mentioned empty sector management field 12. You may prepare in another area.

[0019] Moreover, the above-mentioned empty sector S0 It is a concept also containing the sector on which unnecessary data were recorded.

[0020]

[Effect of the Invention] As explained above, since this invention can equalize the usage count of each sector of a magneto-optic disk, it can prevent that concentrate on a specific sector and record operation is performed. Therefore, while being able to prevent degradation of the regenerative signal by the excess of a usage count and being able to stop the generating frequency of a reproduction error, homogenization of a regenerative signal can also be attained.

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**EFFECT OF THE INVENTION**

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**MEANS**

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OPERATION

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EXAMPLE

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

**[Drawing 1]** It is the functional block diagram of this invention.

**[Drawing 2]** It is the flow view showing the procedure of this invention.

**[Drawing 3]** It is the conceptual diagram of optical-magnetic disc equipment.

**[Description of Notations]**

1 Empty Sector Appearance Means

2 Extraction Means

3 Record Control Means

10 Magneto-optic Disk

Se Management section

So Empty sector

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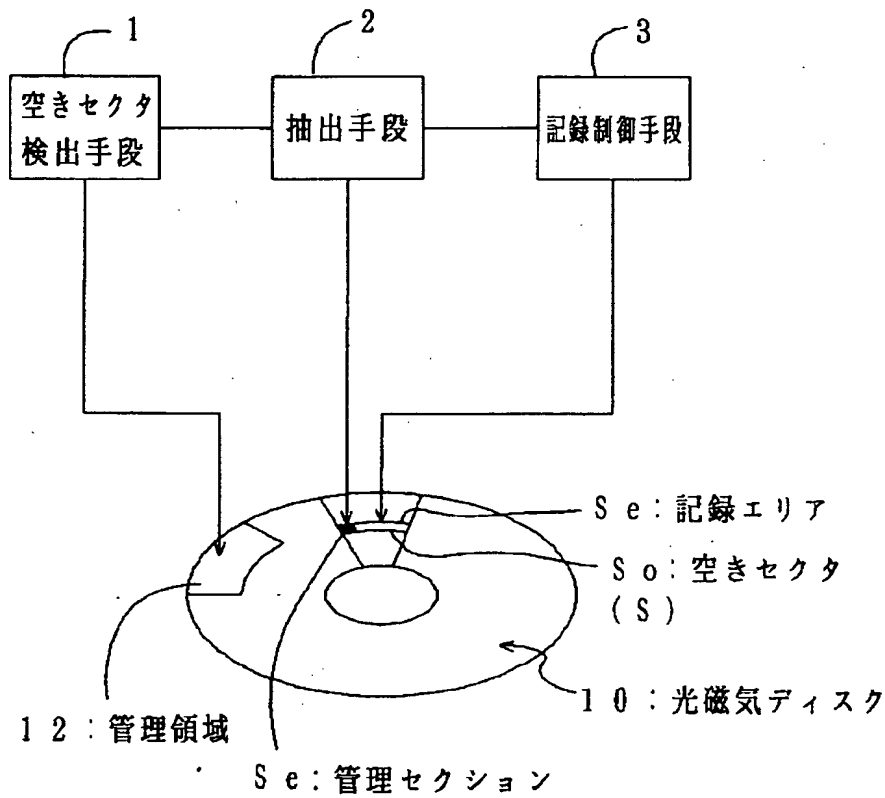
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DRAWINGS

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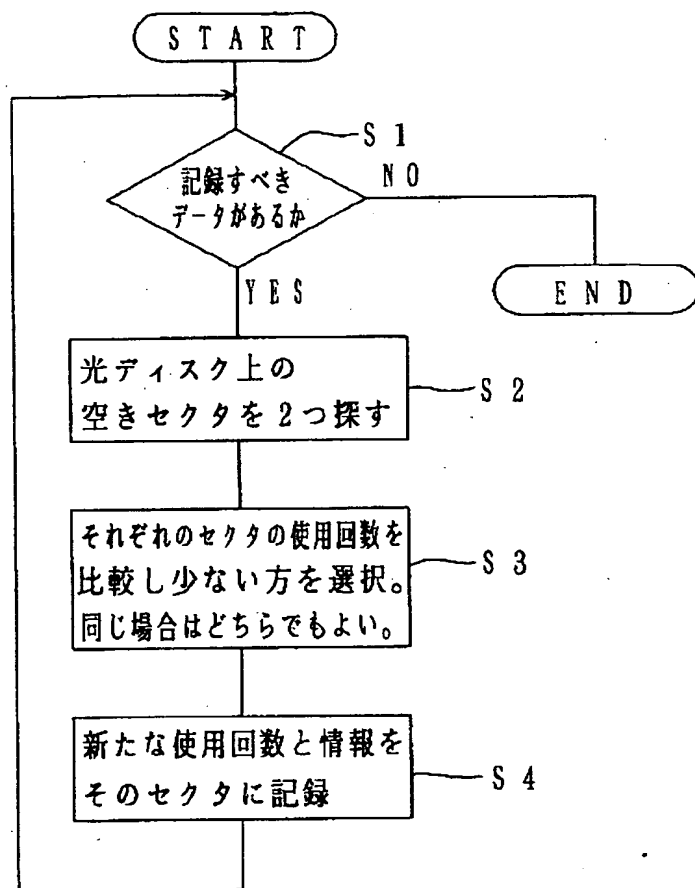
[Drawing 1]

本発明の機能ブロック図



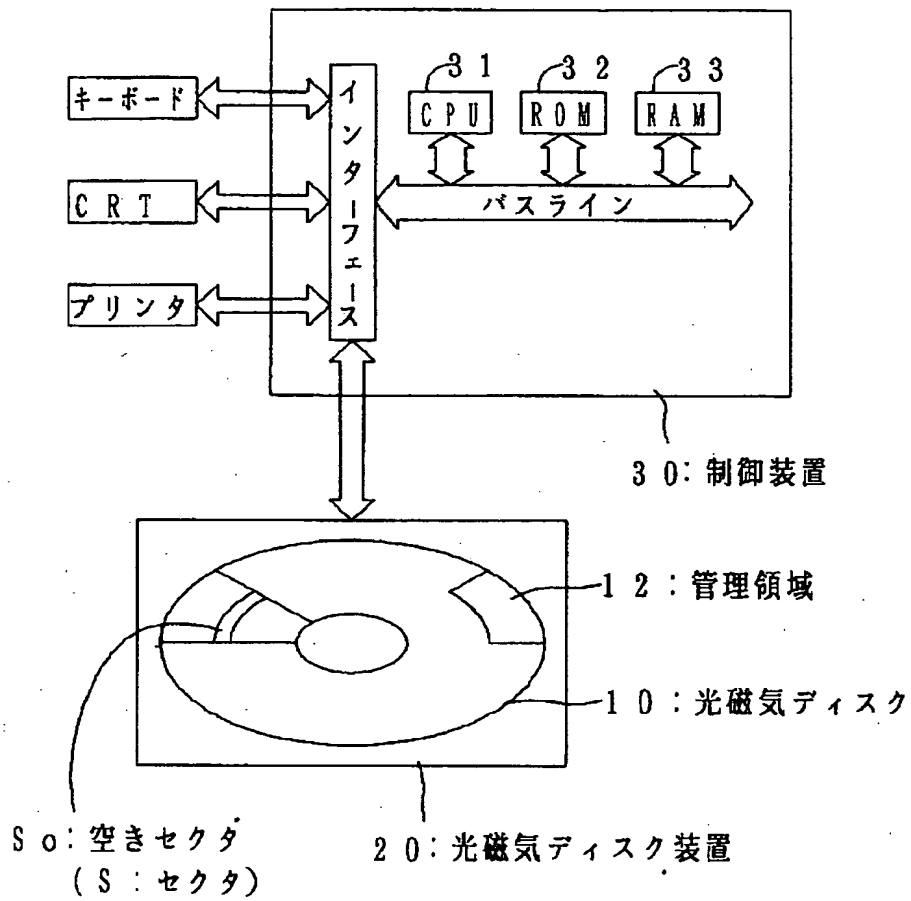
[Drawing 2]

## 本発明の手順を示すフロー図



[Drawing 3]

光磁気ディスク装置の概念図



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[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平5-151712

(43) 公開日 平成5年(1993)6月18日

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G 1 1 B	20/12	9074-5D		
	11/10	Z 9075-5D		
	20/18	Z 9074-5D		
	23/36	B 7201-5D		
	23/42	E 7201-5D		

審査請求 未請求 請求項の数2(全 6 頁)

(21) 出願番号 特願平3-314375

(22) 出願日 平成3年(1991)11月28日

(71) 出願人 000005223

富士通株式会社

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(74) 代理人 弁理士 井桁 貞一

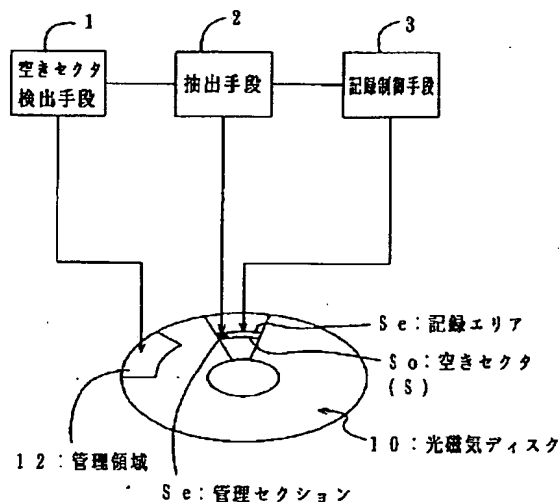
(54) 【発明の名称】 光磁気ディスクの記録方法及び装置

(57) 【要約】

【目的】 光磁気ディスクの記録方法及び装置に関し、使用過多による再生エラーの発生頻度を極力減らすとともに、均質な再生信号を得ることができるようにすることを目的とするものである。

【構成】 記録前に光磁気ディスク10の空きセクタS<sub>0</sub>を検出して、該空きセクタS<sub>0</sub>に情報を記録する光磁気ディスクの記録方法において、各セクタSの使用回数を所定の管理セクションS<sub>e</sub>に記録しておくとともに、記録前に空きセクタ検出手段1で検出される空きセクタS<sub>0</sub>の数を複数とし、その中の最も使用回数の少ない空きセクタS<sub>0</sub>を抽出手段2で記録領域として抽出する構成とする。

本発明の機能ブロック図





## 【特許請求の範囲】

【請求項1】 記録前に光磁気ディスク(10)の空きセクタ(S<sub>0</sub>)を検出して、該空きセクタ(S<sub>0</sub>)に情報を記録する光磁気ディスクの記録方法において、  
各セクタの使用回数を所定の管理セクション(S<sub>e</sub>)に記録しておき、記録前に検出される空きセクタ(S<sub>0</sub>)の数を複  
数とし、その中の最も使用回数の少ない空きセクタ(S<sub>0</sub>)  
を記録対象とすることを特徴とする光磁気ディスクの記  
録方法。

【請求項2】 記録前に光磁気ディスク(10)の空きセクタ(S<sub>0</sub>)を検出して、該空きセクタ(S<sub>0</sub>)に情報を記録する光磁気ディスクの記録装置において、  
記録前に複数の空きセクタ(S<sub>0</sub>)を検出する空きセクタ検出手段(1)と、  
上記空きセクタ検出手段(1)が検出した複数の空きセクタ(S<sub>0</sub>)の中の最も使用回数の少ないセクタ(S<sub>0</sub>)を抽出する抽出手段(2)と、  
各上記抽出された空きセクタ(S<sub>0</sub>)に情報の記録をするのと  
ともに、該空きセクタ(S<sub>0</sub>)の使用回数を所定の領域に記  
録する記録制御手段(3)と、を備えたことを特徴とする  
光磁気ディスクの記録装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】この発明は光ディスクに関し、特に、光磁気ディスクの記録方法と装置に関するものである。

## 【0002】

【従来技術】近年、コンピュータシステムは高性能化が進み、処理速度および処理能力の進歩は著しく、これに伴い外部記憶装置の性能向上が必要となり、高密度記憶装置である光磁気ディスク装置が脚光を浴びている。光磁気ディスクは直径約1μm程度のレーザ光をディスクに照射し、記録膜となる垂直磁化膜の磁気の向きを情報の‘1’、‘0’に対応させているため、磁気ディスク等と比較した場合に記録密度を非常に高くすることができる。

【0003】図3は光磁気ディスクと記録再生装置(光磁気ディスク装置)及び制御装置の概要を示すものである。光磁気ディスク10にはその板面を放射状に区分したセクタ(1周で25セクタ)Sが形成されており、更に、該各セクタSに情報が記録されているか否かを光磁気ディスクの板面上の上記セクタSとは別のエリアに設けた管理領域12で管理するようにしている。

【0004】光磁気ディスク装置20は上記光磁気ディスク10を回転させるスピンドルモータと光磁気ディスク10の板面上に情報の記録再生を行うための光ヘッドと磁気ヘッドを備え、制御装置30によって制御される。制御装置30はCPU31とプログラムを収納したROM32と情報を収納したRAM33を備える他、必要な付属機器を備えている。

【0005】そして、記録する場合にまず光ヘッドを上記管理領域12上に位置させて制御装置30によって空きセクタS<sub>0</sub>を見つけ、その空きセクタS<sub>0</sub>のアドレスから光学ヘッド及び磁気ヘッドを該空きセクタS<sub>0</sub>上に位置合わせし、該空きセクタS<sub>0</sub>に消去をかける。この消去は記録膜がキュリー温度以上になるようなパワーでレーザ光を照射し、磁界を消去方向に印加することによって行われる。次いで、消去時またはそれより弱いパワーの磁界を消去方向とは逆方向に記録情報に応じて印加することによって記録がなされる。

【0006】これによって情報の‘1’、‘0’に対応した磁化状態(上向きと下向き)が光磁気ディスク10上に形成され、記録を行うことが可能となる。再生を行う場合には、記録膜の温度が上昇しない程度のレーザ光を照射し、磁化の向きにより反射光に含まれる偏光面が回転するカー効果の原理を用いて再生を行うようになっている。

## 【0007】

【発明が解決しようとする課題】しかしながら、上記のような構成では、光磁気ディスク上の同一セクタに繰り返し情報を記録することになるので、その繰り返しの回数が増えると光磁気ディスクの記録膜やその保護膜が劣化し記録特性が悪くなり、該セクタを再生して得られる信号が劣化し、再生エラーの原因となる。

【0008】特開昭63-249974号公報には上記課題を解決する一つの方法として、複数のセクタごとに1つの管理セクタを設けておき、該管理セクタに該複数のセクタ群の使用回数を記録し、該使用回数が所定値以上になったときに、該セクタSへの記録を禁止する光ディスク装置が開示されている。

【0009】しかしながら、この方法によると、各セクタ群間に使用頻度のばらつきがあっても是正することができず、再生信号の質にばらつきを生ずることになるとともに、使用期間が長くなるにともなって、使用禁止されるセクタ群が増え書き込み容量が小さくなる欠点がある。

【0010】この発明は上記従来の事情に鑑みて提案されたものであって、使用過多による再生エラーの発生頻度を極力減らすとともに、均質な再生信号を得ることができる光磁気ディスクの再生方法及び装置を提供することを目的とするものである。

## 【0011】

【課題を解決するための手段】この発明は上記目的を達成するために以下の手段を採用している。すなわち、図1に示すように記録前に光磁気ディスク10の空きセクタS<sub>0</sub>を検出して、該空きセクタS<sub>0</sub>に情報を記録する光磁気ディスクの記録方法において、各セクタSの使用回数を所定の管理セクションS<sub>e</sub>に記録しておくとともに、記録前に検出される空きセクタS<sub>0</sub>の数を複  
数とし、その中の最も使用回数の少ない空きセクタS<sub>0</sub>を記

録領域とするものである。

【0012】上記複数の空きセクタS。は空きセクタ検出手段1で検出されるようにし、また抽出手段2で上記のように検出された複数の空きセクタS。の中の最も使用回数の少ないセクタS。を抽出し、更に記録制御手段3で、抽出された空きセクタS。に情報の記録をするともに、該空きセクタS。の使用回数を所定の領域に記録するようにする。

【0013】

【作用】空きセクタS。を複数選択しその中の最も使用回数の少ない空きセクタS。に記録することによって、各セクタの使用回数は常に均一となる。これによって、光磁気ディスクの使用時間が長くなっても、得られる再生信号を均質化することができるとともに、特定のセクタの再生信号の品質が劣化することが防止される。

【0014】

【実施例】図1は本発明の装置の機能ブロック図であり、図2は本発明の手順を示すフロー図である。

【0015】まず、記録指示があったとき（記録すべきデータがあるとき）（図2ステップS1）、光ヘッドは光磁気ディスク10の管理領域12を検索し、その情報を空きセクタ検出手段1に伝送する。空きセクタ検出手段1は上記情報から複数の空きセクタS。（例えば2つの空きセクタ）を検出する（図2ステップS2）。

【0016】このように検出された複数の空きセクタS。のそれぞれについて、更に使用回数を調べる。すなわち、この使用回数は各セクタSの先頭部の特定の管理セクションSeに書き込むようにしておき、上記空きセクタS。が選択されると、その空きセクタS。のアドレスに従って光ヘッドを光磁気ディスク10上を移動させて、上記管理セクションSeに記録された使用回数情報を再生する。この情報を抽出手段2で読み取って上記2つの空きセクタS。の中の使用回数の低い方の空きセクタS。を抽出する（図2ステップS3）。そして、記録制御手段3を用いてこのように抽出された空きセクタS。の管理セクションSeに新たな使用回数（1を加えた使用回数）を書き込むとともに、該セクタS。の記録エ

リアSdに情報を書き込む（図2ステップS4）。

【0017】これによって書き込み時には、常に使用回数の少ない方の空きセクタS。が選択され、使用回数が多くなっても全体として各セクタSの記録回数が均質化し、均質な再生信号を得ることができる。

【0018】尚、上記空きセクタ検出手段1、抽出手段2、記録制御手段3は上記制御装置30にソフト的な機能として追加するようにしてもよいし、あるいは別のソフト、あるいは回路として追加してもよい。また、上記において、空きセクタS。として抽出される数を2つとしたが、処理時間が多少長くなることを無視すれば、上記空きセクタS。として抽出される数が多い程、使用回数の均質化を得ることができる。また、使用回数を管理する管理セクションSeを各セクタS。の先頭部に設けたが、上記空きセクタ管理領域12のように各セクタS。と別のエリアに設けてもよい。

【0019】また、上記空きセクタS。とは不要データが記録されたセクタをも含む概念である。

【0020】

【発明の効果】以上説明したようにこの発明は、光磁気ディスクの各セクタの使用回数を平均化することができるので、特定のセクタに集中して記録動作が行われることを防止することができる。従って使用回数過多による再生信号の劣化を防止することができ、再生エラーの発生頻度を抑えることができるとともに、再生信号の均質化も図ることができる。

【図面の簡単な説明】

【図1】本発明の機能ブロック図である。

【図2】本発明の手順を示すフロー図である。

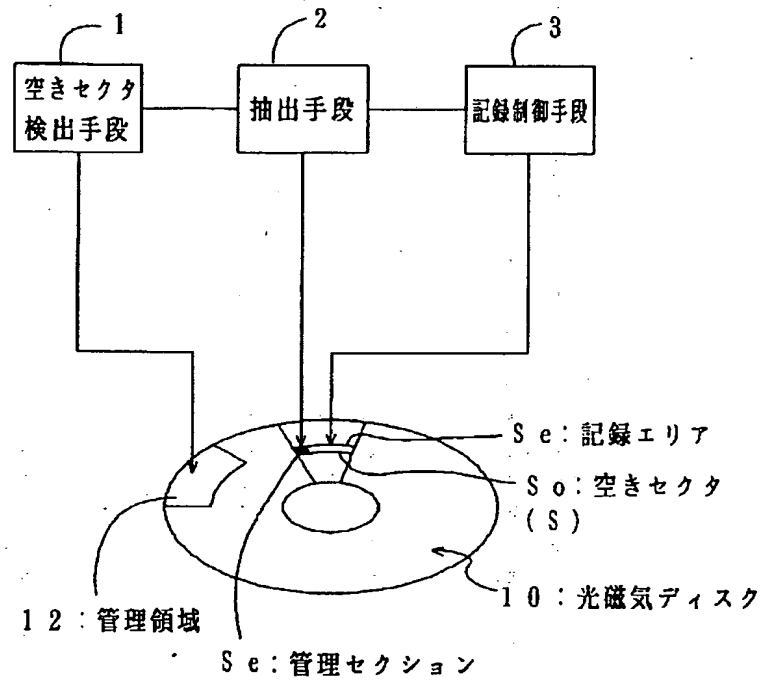
【図3】光磁気ディスク装置の概念図である。

【符号の説明】

- 1 空きセクタ検出手段
- 2 抽出手段
- 3 記録制御手段
- 10 光磁気ディスク
- Se 管理セクション
- So 空きセクタ

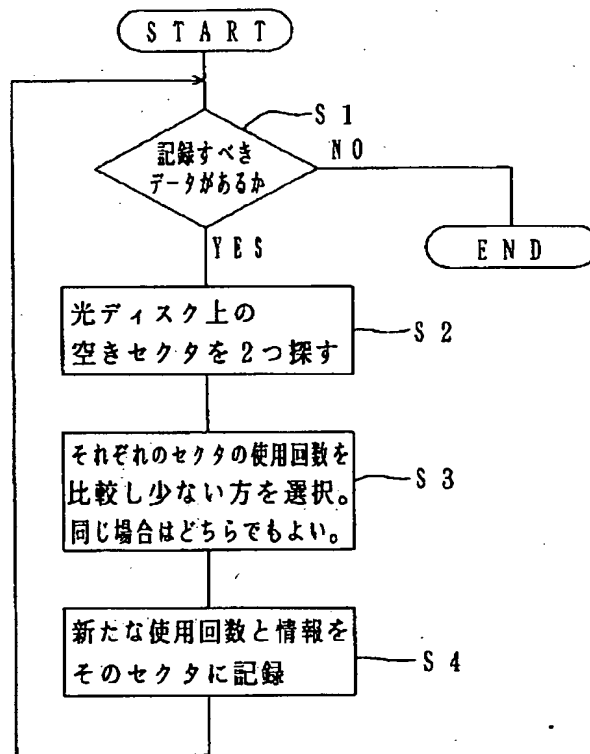
【図1】

本発明の機能ブロック図



【図2】

本発明の手順を示すフロー図



【図3】

## 光磁気ディスク装置の概念図

